PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	**FOR FURTHER ACTION** See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP 03/06369	International filing date *(day/month/year)* 17.06.2003	Priority date *(day/month/year)* 19.06.2002
International Patent Classification (IPC) or both national classification and IPC F16D1/10		
Applicant ASTERIKA LIMITED et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 8 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the opinion
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
16.01.2004	27.09.2004
Name and mailing address of the international preliminary examining authority: European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer J. Giráldez Sánchez Telephone No. +31 70 340-3488

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP 03/06369

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, Pages

1-12, 14, 15	as originally filed
13	received on 16.06.2004 with letter of 14.06.2004

Claims, Numbers

1-7	received on 16.06.2004 with letter of 14.06.2004

Drawings, Sheets

1	as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).

   ☐ the language of publication of the international application (under Rule 48.3(b)).

   ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   ☐ contained in the international application in written form.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority in written form.

   ☐ furnished subsequently to this Authority in computer readable form.

   ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   ☐ the description, pages:

   ☐ the claims, Nos.:

   ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-7
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-7
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-7
	No:	Claims	

2. Citations and explanations

   see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1 Reference is made to the following document:

D1: DE 31 22 575 A (FAUN WERKE) 23 December 1982 (1982-12-23)

2 The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and shows (the references in parentheses applying to this document):

Connection device between members of a machine comprising at least one first (20,22) and one second (39) coupling suitable for being connected together to orientate said members of said machine in work position, in that said first coupling (20,22) comprises at least one first (22) and one second (20) toothed elements mutually mobile between an initial reference configuration and a work configuration recreating said initial reference configuration and corresponding to a predetermined orientation of said members of said machine, said second coupling (39) comprising at least two toothed elements (40) fixed together with said initial configuration and mutual displacement means of said second coupling (39) with respect to said first coupling (20,22) suitable for taking said second coupling (39) into a connection position with said first coupling (20,22) once said work condition of said first coupling (20,22) has been reached in correspondence with a small relative displacement between said first (22) and second (20) toothed elements of said first coupling equal to the difference between the sum of the pitch of two or more teeth of said first toothed element (22) of said fist coupling and the sum of the pitch of two or more teeth of said second toothed element (20) of said first coupling (20,22).

3 The subject-matter of claim 1 differs from this known connection device in that said mutually mobile toothed elements of said first coupling of said first couling having different numbers of teeth, said mutually fixed toothed elements of said second coupling having different numbers of teeth, the difference between the number of teeth of said first and second mobile toothed elements being greater than one and, moreover, the difference between the number of teeth of said two fiwed toothed elements being greater than one.

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

4 The problem to be solved by the present invention may be regarded as realising a connection device between members of a machine which is flexible and capable of working with very high resolution.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

The documents cited in the Search Report do not give any suggestion to the skilled person to modify a connection device between members of a machine as substantially disclosed in D1 in the manner specified in claim 1.

The features of claim 1, that said mutually mobile toothed elements of said first coupling of said first couling having different numbers of teeth, said mutually fixed toothed elements of said second coupling having different numbers of teeth, the difference between the number of teeth of said first and second mobile toothed elements being greater than one and, moreover, the difference between the number of teeth of said two fiwed toothed elements being greater than one, result from a step being non-obvious in view of the cited prior art. Thus the connection device according to claim 1 involves an inventive step.

5 Claims 2-7 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

In a seventh example we want to realise a device that is able to obtain a resolution of 0.005°.

Using a conventional device toothed elements would have to be realised having an outer diameter equal to about 50,000 millimetres, whereas using the device according to the finding toothed elements having an outer diameter of about 500 millimetres are sufficient.

In an eighth example we want to realise a device that is able to obtain a resolution of 0.001°.

Thus, considering an outer toothed element with 625 teeth and an inner toothed element with 576 teeth, and rotating the inner toothed element with respect to the outer toothed element of the first coupling in a certain direction of rotation by an amount equal to such a minimum resolution, the alignment between the fifty-first tooth of the outer toothed element and the forty-seventh tooth of the inner toothed element of such a first coupling is recreated, then the second coupling is rotated by 29,376° in the same direction as the direction of rotation of the inner toothed element of the first coupling so as to achieve the engagement with the first coupling.

Using a conventional device toothed elements would have to be realised having an outer diameter equal to about 250,000 millimetres, whereas using the device according to the finding toothed elements having an outer diameter of about 550 millimetres are sufficient.

In a ninth example we want to realise a device that is

CLAIMS

1. Connection device between members of a machine comprising at least one first and one second coupling suitable for being connected together to orientate said members of said machine in work position, characterised in that said first coupling comprises at least one first and one second toothed elements mutually mobile between an initial reference configuration and a work configuration corresponding to a predetermined orientation of said members of said machine, said second coupling comprising at least two toothed elements fixed together with said initial configuration and mutual displacement means of said second coupling with respect to said first coupling suitable for taking said second coupling into a connection position with said first coupling once said work condition of said first coupling has been reached in correspondence with a small relative displacement between said first and second toothed elements of said first coupling equal to the difference between the sum of the pitch of two or more teeth of said first toothed element of said first coupling and the sum of the pitch of two or more teeth of said second toothed element of said first coupling.

~~2. Device according the previous claim, characterised in~~ that said displacement means are suitable for mutually displacing said second coupling with respect to said first coupling by an amount proportional to the relative ~~displacement of the two elements of the first coupling.~~

~~3. Device according to one or more of the previous~~ claims, characterised in that said mutually mobile toothed elements of said first coupling have an annular configuration and are concentric and, correspondingly, said mutually fixed toothed elements of said second coupling have an annular ~~configuration and are concentric.~~

~~4. Device according to one or more of the previous claims, characterised in that~~ said mutually mobile toothed elements of said first coupling have different numbers of teeth,

~~5. Device according to one or more of the previous claims, characterised in that~~ said mutually fixed toothed elements of said second coupling have different numbers of teeth,

~~6. Device according to one or more of the previous~~ claims, characterised in that inner mobile toothed elements and inner fixed toothed elements have less teeth than corresponding outer mobile toothed elements and outer fixed toothed elements.

7. Device according to one or more of the previous claims, characterised in that said inner mobile toothed elements and said inner fixed toothed elements have the same number of teeth and, in the same way, said outer mobile toothed elements and said outer fixed toothed elements have ~~the same number of teeth.~~

~~8. Device according to one or more of the previous claims, characterised in that~~ the difference between the

number of teeth of said ~~outer~~ FIRSTA AND SECON mobile toothed elements ~~and of said inner mobile toothed elements is~~ BEING greater than one and, moreover, the difference between the number of teeth of said ~~outer~~ TWO fixed toothed elements ~~and of said inner fixed toothed elements is~~ BEING greater than one.

~~9. Device according to one or more of the previous~~ claims, characterised in that said machine is a chip machine.

10. Device according to one or more of the previous claims, characterised in that said device connects a piece-carrying table and/or a treatment head and/or a piece-carrying chuck and/or a divider to a structure of said machine.

11. Machine tool comprising a connection device between its members comprising at least one first and one second coupling suitable for being connected together to orientate said members of said machine in work position, characterised in that said first coupling comprises at least one first and one second toothed elements mutually mobile between an initial reference configuration and a work configuration corresponding to a predetermined orientation of said members of said machine tool, said second coupling comprising at least two toothed elements fixed together with said initial configuration and displacement means of said second coupling with respect to said first coupling suitable for taking said second coupling into a connection position with said first coupling once said work condition of said first coupling has ~~been reached in correspondence with a relative displacement~~

CLAIMS

1. ~~Connection device between members of a machine~~ comprising at least one first and one second coupling suitable for being connected together to orientate said members of said machine in work position, characterised in that said first coupling comprises at least one first and one second toothed elements mutually mobile between an initial reference configuration and a work configuration corresponding to a predetermined orientation of said members of said machine, said second coupling comprising at least two toothed elements fixed together with said initial configuration and mutual displacement means of said second coupling with respect to said first coupling suitable for taking said second coupling into a connection position with said first coupling once said work condition of said first coupling has been reached in correspondence with a small relative displacement between said first and second toothed elements of said first coupling equal to the difference between the sum of the pitch of two or more teeth of said first toothed element of said first coupling and the sum of the pitch of two or more teeth of said second toothed element ~~of said first coupling~~.

2. Device according the previous claim, characterised in that said displacement means are suitable for mutually displacing said second coupling with respect to said first coupling by an amount proportional to the relative displacement of the two elements of the first coupling.

3. Device according to one or more of the previous claims, characterised in that said mutually mobile toothed elements of said first coupling have an annular configuration and are concentric and, correspondingly, said mutually fixed toothed elements of said second coupling have an annular configuration and are concentric.

~~4. Device according to one or more of the previous~~ claims, characterised in that said mutually mobile toothed elements of said first coupling have different numbers of teeth.

5. Device according to one or more of the previous claims, characterised in that said mutually fixed toothed elements of said second coupling have different numbers of ~~teeth.~~

4 ~~6~~. Device according to one or more of the previous claims, characterised in that inner mobile toothed elements and inner fixed toothed elements have less teeth than corresponding outer mobile toothed elements and outer fixed toothed elements.

~~7. Device according to one or more of the previous~~ claims, characterised in that said inner mobile toothed elements and said inner fixed toothed elements have the same number of teeth and, ~~in~~ the same way, said outer mobile toothed elements and said outer fixed toothed elements have ~~the same number of teeth~~.

~~8. Device according to one or more of the previous claims, characterised in that the difference between the~~

~~number of teeth of said outer mobile toothed elements and of~~ said inner mobile toothed elements is greater ~~than~~ one and, moreover, the difference between ~~the~~ number of teeth of said outer fixed ~~toothed~~ elements and of said inner fixed toothed ~~elements is greater than one~~.

5 ~~9~~. Device according to one or more of the previous claims, characterised in that said machine is a chip machine.

6 ~~10~~. Device according to one or more of the previous claims, characterised in that said device connects a piece-carrying table and/or a treatment head and/or a piece-carrying chuck and/or a divider to a structure of said machine.

7 ~~11~~. Machine tool comprising a connection device between its members comprising at least one first and one second coupling suitable for being connected together to orientate said members of said machine in work position, characterised in that said first coupling comprises at least one first and one second toothed elements mutually mobile between an initial reference configuration and ~~q~~work configuration corresponding to a predetermined orientation of said members of said machine tool, said second coupling comprising at least two toothed elements fixed together with said initial configuration and displacement means of said second coupling with respect to said first coupling suitable for taking said second coupling into a connection position with said first coupling once said work condition of said first coupling has been reached in correspondence with a relative displacement

between said first and second toothed elements of said first coupling equal to the difference between the sum of the pitch of two or more teeth of said first element of said first coupling and the sum of the pitch of two or more teeth of said second toothed element of said first coupling.

~~12. Connection device between members of a machine, all as described, represented and claimed.~~

SAID MUTUALLY MOBILE TOOTHED ELEMENTS OF SAID FIRST COUPLING HAVING DIFFERENT NUMBERS OF TEETH, SAID MUTUALLY FIXED TOOTHED ELEMENTS OF SAID SECOND COUPLING HAVING DIFFERENT NUMBERS OF TEETH, THE DIFFERENCE BETWEEN THE NUMBER OF TEETH OF SAID ~~OUTER~~ FIRST AND SECOND MOBILE TOOTHED ELEMENTS ~~AND OF SAID INNER~~ BEING GREATER THAN ONE AND, MOREOVER, THE DIFFERENCE BETWEEN THE NUMBER OF TEETH OF SAID TWO FIXED TOOTHED ELEMENTS BEING GREATER THAN ONE.